Third Generation Federal State Educational Standards Requirements to Student Research Work
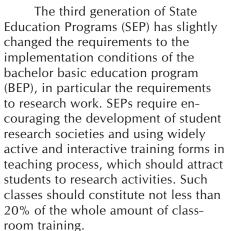
M.K. Ammosov North-Eastern Federal University in Yakutsk
V.N. Federov

According to the State educational standards of the third generation student's research work management should be focused on the development of both cross-cultural and professional competences. However, student research skills are developed at the final stage of training, particularly, while preparing a final qualification project.

Key words: student research work, competences, Federal State Educational Standard.

V.N. Federov

The third generation of State Education Programs (SEP) has slightly changed the requirements to the implementation conditions of the bachelor basic education program (BEP), in particular the requirements to research work. SEPs require encouraging the development of student research societies and using widely active and interactive training forms in teaching process, which should attract students to research activities. Such classes should constitute not less than 20% of the whole amount of classroom training.

In 2009 St. Petersburg State Electrotechnical University (ETU) developed the third generation of Bachelor SEP for speciality 210400 "Radio Technology" [1]. Duration of training is 4 years and workload is 240 credit units (c.u.). A credit unit is equal to 36 academic hours. (a.h.) if compared to second generation SEP.

According to basic and special training of bachelors in speciality 210400 "Radio Technology" they can fulfill six kinds of activities one of which is research. Thus the student's research workload can be estimated as 40 c.u. It includes:

1. Scientific and technical information analysis, analysis of domestic and foreign experience in the research topics (8 c.u.);

2. Object and process modeling including modeling by means of standard application programs (8 c.u.);

3. Participation in planning and conducting experiments according to a given procedure, data interpretation using modern IT and technical tools (8 c.u.);

4. Making reviews and reports on conducted research (8 c.u.);

5. Ensuring protection of intellectual property and research results and developments (8 c.u.).

Research is regulated by State Standard Specification 15.101-80 and is defined as a complex of theoretical or (and) practical experimental research conducted to obtain benchmark data or to find principles and ways of product development or modernization [2].

Research activities can be divided into fundamental, applied and exploratory, whereas fundamental and

exploratory ensure generation of ideas that can be transformed into science, research, experimental and engineering projects (R&D).

It is obvious that most of graduates will be involved in innovative activities, applied research or accompanied activities even if they don't work in scientific establishments.

New bachelor BEP requirements have new notion – competences that are defined as the ability to apply knowledge, skills and personal qualities for successful problem-solving in a certain domain. The competencies are divided into cross-cultural (CC) and professional (PC) ones.

Six out of 19 CCs (32%), necessary for bachelors in speciality 210400 "Radio technology", ensure successful research activity:
- to have thinking culture, to be able to compile, analyze and perceive information, to set a goal and to find the ways of its achievement (CC-1);
- to express logically and structurally correctly his\her ideas both orally and in written form (CC-2);
- to be ready to collaborative and team work (CC-3);
- to use basic natural laws in professional problem-solving activities , to apply methods of mathematical analysis and modeling, theoretical and experimental research (CC-10);
- to apply basic means and methods of data collecting and interpreting, to use computing technologies for data management (CC-12);
- to be able to use Internet as a means of information obtaining (CC-13).

Seven (22%) PC out of 32 can be referred to student's ability to research work:
- to be able to collect, analyze, interpret and organize scientific data in the domain of his/her research, to use achievements of domestic and foreign techniques and technology (PC-6);
- to be able to collect, analyze scientific and technical information, to compile domestic and foreign experience in radiotechnics, to analyze patent literature (PC-18);
- to apply object and process mathematical modeling according to typical methods, including modeling by means of standard application programs (PC-19);
- to be able to implement experimental research programs including the choice of correct technical means, and data interpreting (PC-20);
- to be ready to take part in making analytical reviews and scientific and technical reports on fulfilled work, to prepare edition of research results in forms of presentations, articles and repots (PC-21);
- to be able to implement and develop research results and to ensure protection of intellectual property and research results and developments (PC-22);
- to be able to work as a leader of small teams (PC-23).

Thus, 13 (26%) out of 51 competencies are necessary for successful graduate's research activities.

Bachelor basic education program (BEP) provides 6 subject modules that form the following competences relevant to research activities:
- M1 - Humanitarian, social and economics subjects: CC-1...CC-3, total 3;
- M2 – Mathematics and natural sciences: CC-10, total 1;
- M3 – Professional subjects: CC-13, PC-6, PC-18...PC-21, PC-23, total 7;
- M4 – Physical culture: none;
- M5 – Internships: CC-3, CC-13, PC-20, PC-23, total 4;
- M6 – Final state certification: CC-1 ...CC-3, CC-10, CC-12, CC-13, PC-6, PC-18... PC-22, total 12.

Tables 1 and 2 describe comparative importance of cross-cultural and professional competencies in student's training for research work. It shows that according to FSES HPE, the leading role in the formation of student's research abilities is played by final state certification (12 competencies), professional module (7 competencies), internships (4 competencies) and the module of humanitarian, social and economic subjects (3 competencies).

Strange as it may seem, but mathematics and natural sciences shouldn't influence the research competency formation.

50% of the subjects are instituted by University State Education Standards. Internships can be research work. Final state certification summarizes the studied subjects in the final qualification project that contains a massive proportion of research work.

Research program (for internships) should ensure for students the following opportunities:
- to study professional literature and other scientific and technical information, foreign and domestic achievements of scientific and technical knowledge;
- to conduct research and perform engineering tasks;
- to collect, interpret, analyze and classify necessary scientific and technical information;
- to make reports at conferences etc.

Bachelor BEP implementation of research activities are performed by teaching staff with PhD or Doctor's degrees who are constantly engaged in research activities. Every student should be supplied with Internet, library and other data base access.

To ensure quality of learning/teaching process there is a list of requirements to minimal facilities. It includes laboratories equipped with modern measuring equipment, IT tools, industrial samples of devices and systems and special research equipment.

The Internet access hours for student's independent research work from University computers should

Table 1. Comparative Importance of Cross-Cultural Competencies in Student's Research Training

	CC-1	CC-2	CC-3	CC-11	CC-12	CC-13	Total:
M1	x	x	x				3
M2				x			1
M3						x	1
M5			x			x	2
M6	x	x	x	x	x	x	6
Total:	2	2	3	3	1	2	13

Table 2. Comparative Importance of Professional Competencies in Student's Research Training

	PC-6	PC-18	PC-19	PC-20	PC-21	PC-22	PC-23	Total:
M1								0
M2								0
M3	x	x	x	x	x		x	6
M5				x			x	2
M6	x	x	x	x	x	x		6
Total:	2	2	2	3	2	1	2	14

be not less than 2 hours a week per student.

The University should be supplied with necessary licensed software.

Thus, the current State Education Standards of Higher Professional Education of the third generation contain more cognitive components, and professional competencies hardly reach 50%.

Meanwhile, there is no difference between competencies of Bachelor, Specialist and Master Degrees. Competencies of all Degrees are often identical.

To perform Bachelor research activity (to manage internships, human resource, methodical, information and facility support of teaching process) it is necessary to make great changes in internship system and staff choice. Methodical, information and facility support of teaching process should be constantly updated to meet the changing conditions of labor market, new technologies and research fields.

It is also necessary to solve legal problems, in particular the correlation of scientific Degrees.

REFERENCES:
1. FSES HPE speciality 210400 "Radiotechnics" (Bachelor Degree) [Electronic resource]: approved by Ministry of Education and Science of the RF, 22.12.2009. №814//Russian education:federal education portal. – M., 2002-2012. – URL: http:// www.edu.ru/db/mo/Data/d_09/prm814-1. pdf, free. - Title from the screen (reference date:15.12.2012).
2. State Standard Specification 15.101-98. Research Conduction Regulation [Electronic resource]. – Instead of State standard specification 15.101-80, introd. 01.07.2000; reissued 2003. – Minsk, 2003. – p. 5.- URL:http://www.gosthelp.ru/gost/gost8517. html, free. - Title from the screen (reference date:15.12.2012).